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AN ANCIENT AND CONTEMPORARY REVIEW ON SNAKES

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ABSTRACT

The whole world is created by God and human is the best creation. But instead of human, God created different diversities of plants as well as animals. Due to their versatilities entire eco- system is balanced because these all depends on each other. If talked about animals, there are many species but here we described only about type of snakes. *Samhita* and *Vedas* have also described types and features of various type snakes. *Acharya Sushruta* has mentioned total eighty *sarpa* with names in *kalpa sthana* of the *Sushruta Samhita*. So here we will describe wisdom of snakes according to *Ayurveda* as well as modern science.

Keywords: *Acharya sushruta, kalpa sthana, vedas*, *sarpa*, snakes, *samhita*, *ayurveda*.

INTRODUCTION

Near about 2500 or 3000 species of snakes are known. Snakes are found everywhere on the earth except Antarctica. Snakes are very specialized group of reptiles under the order ophidia. Like all the reptiles, snakes are also cold blooded which means they are able to maintaining of a stable body temperature for their proper functioning. Snakes are highly mobile reptile which is able to move over sand and rocks, climb on rock walls and the thinnest tree branches and as well as can swim at a high speed even without limbs. These are depends on many animals for their feeding like-mice, rats, frogs, fish etc. but some snakes can eat large species like deer etc. It is a very dangerous reptile and fatal for human as well as many other animals. It can be poisonous and non- poisonous. WHO has estimated that thirty to forty thousand peoples die annually by snake bite. The poisonous snake has labial glands which are modified into poisonous glands but these are not helpful for their digestion. Usually snakes use their venom to kill prey or for self-defense. Snake bite itself comes under the medical-emergency. The South East Asia region is one of the world's most affected regions, due to its high population density, widespread agriculture activities, and presence of numerous snakes and lack of awareness. Snakes can play an important role in agriculture because they control the population of harmful rodents and pests.

Acharya Sushruta told two types of *visayonis* (form of origin of poison), first is *sthavara* (plant origin) and the second one is *jangama* (animal origin).

Ayurveda has mentioned major ten *adhisthan* (site of poison) for the sthavaravisa and sixteen for the *jangamavisa*.[1]

Sthavaravisa Adhisthana (site of poison): Ten *adhisthana* of *sthavaravisa* are *mool* (root), *patra* (leaf), *phala* (fruit), *pushp* (flower), *tvaka* (bark), *skhira* (milk), *sara* (pith), *niryasa* (gum), *dhatu* (minerals) and *kand* (bulb) of a plant.[2]

Jangamavisa Adhisthana (site of origin): Sixteen *adhisthana* of *jangamavisa* are *Dristi* (sight), *nisvasa* (breath), *damstra* (fangs), *nakha* (nail), *mutra* (urine), *purisa* (stool), *sukra* (semen), *lala* (saliva), *aartava* (menstrual blood), *mukhsamdansa* (stings), *visardhita* (flatus), *tunda* (beak) *asthi* (bones), *pitta* (bile), *suka* (bristles\hairs) and *sava* (dead body) of an animal[3]. *Acharya Sushruta* has mentioned two types of snakes, first is *Divya* (Divine) and others are *bhouma* (Terrestrial) *sarpa*. Among these sixteen sites of poison, snakes has only three like sight, breath and teeth. *Divya* (divine) snakes contains their poison in sight and breath while *bhouma* (terrestrial) snakes in their fangs.

Division of snakes according to *Acharya sushruta*[4]:

1. ***Divya* (divine) *sarpa*-** According to *Acharya sushruta Vasuki sarpa* is the best among all the snakes and also told it as a king of all the snakes which hold the whole earth. It shines like the sun and it can destroy whole world by their sight and breath. They are countless and there is no treatment for their wrath means they are totally fatal.
2. ***Bhouma* (terrestrial) *sarpa*-** According to *Acharya sushruta* terrestrial snakes are total eighty in counting and classified into five types: 1. *Darvikara* (hooded) sarpa, 2. *Mandali* (hoodless and painted with circular patches) sarpa, 3. *Rajimanta* (hoodless and striped) sarpa, 4. *Nirvisa* (non-poisonous) *sarpa*, 5. *Vaikaranja* (hybrid species) *sarpa*. *Darvikara sarpa* are twenty six (26), *mandali sarpa* are twenty two (22), *rajimanta* are ten (10), *nirvisa sarpa* are twelve (12) and *vaikaranja sarpa* are three (3) in numbers.

- ***Darvikara* (Hooded) *sarpa***: Snakes which have marks like wheel, plough, umbrella, *swastika* and *ankusha* and which make a *phana* (hood) are *darvikara* snakes. They move very fast. *Krsnasarpa*, *mahakrsna*, *krsnodara*, *svetakapota*, *mahakapota*, *balahaka*, *mahasarpa*, *sankhakapala*, *lohitaksa*, *gavedhuka*, *parisarpa*, *khandaphana*, *kakuda*, *padma*, *mahapadma*, *darbhapuspa*, *dadhimukha*, *pundarika*, *bhrukutimukha*, *viskira*, *puspahikirna*, *girisarpa*, *rujusarpa*, *svetodara*, *mahasira*, *alagarda* and *aashivisa* all are *darvikara* snakes.
- ***Mandali* (Hoodless and painted with circular patches) *sarpa*:** Snakes which have different patches on their whole body, big in size and move slowly are *mandali* snakes. They resembles with fire and sun. *Adarsamandala*, *svetamandala*, *raktamandala*, *citramandala*, *prsata*, *rodhrapuspa*, *milindaka*, *gonasa*, *vriddhagonasa*, *panas*, *mahapanasa*, *venupatraka*, *sisuka*, *madana*, *palindira*, *pingala*, *tantuka*, *puspapandu*, *sadnga*, *agnikababhru*, *kasaya*, *kalusa*, *paravata*, *hastabharana*, *citraka* and *enipada* are *mandali* snakes.
- ***Rajimanta* (hoodless and striped) *sarpa*:** Snakes which are unctuous, with different colors, having stripes above and sides of their body are *rajimanta* snakes. *Pundrika*, *rajicitra*, *angularaji*, *binduraji*, *kardamaka*, *trnasosaka*, *sarsapaka*, *svetahanu*, *darbhapuspa*, *cakraka*, *godhmaka* and *kikkisada* are *rajimanta* snakes.
- ***Nirvisa* (non-poisonous) *sarpa***: These snakes are non- poisonous. *Galgoli*, *sukapatra*, *ajagara*, *divyaka*, *varsahika*, *puspasakali*, *jyotiratha*, *ksirikapuspaka*, *ahipataka*, *andhahika*, *gaurahika* and *vrksesaya* are *nirvisa* snakes.
- ***Vaikaranja* (hybrid species) *sarpa*:** These are hybrid snakes and born by the mating of *darvikara* and other three kinds of snakes. These

are *makuli*, *potagala* and *snigdharaji*. *Makuli* is the combination of *darvikara* and *mandali*, *potagala* is the combination of *rajimanta* and *mandali*, *snigdharaji* is the *rajimanta* and *darvikara*.

The three *vaikaranja* are of seven kinds such as – *divyelaka*, *rodhrapuspaka*, *rajichitraka*, *potagala*, *puspabhikirna*, *darbhapuspa* and *vellitaka*. The first three are like as *rajimanta* snake and the remaining are like as *mandali* snakes[5].

Classification of snakes on the basis of their gender[6]:

1. **Male snakes:** The snake which have large eyes, tongue, face and head are male snakes.
2. **Female snakes:** The snake which have small eyes, tongue, face and head are female snakes.
3. **Mixed (*Napunsaka*) snakes:** The snake which have mixed characters, mild poison and non-angry are eunuchs snakes.

Classification of snakes on the basis of their caste[7]:

1. ***Brahmana* snake:** Snakes which have shining like pearls, silver and yellowish, having pleasant smell, brightness like gold are *brahmana* snake.
2. ***Ksatriya* snake:** Snakes which have unctuous color, getting angry very fast, having marks like sun, moon and umbrella on their body and which dwell in water are *ksatriya* snake.
3. ***Vaisya* snake:** Snakes which are black, resembling with diamond, smoky and pigeon like color are *vaisya* snake.
4. ***Sudra* snake:** Snakes which resemble to buffalo or leopard in color, hard or rough skin and have various colors are *sudra* snakes.

***Sarpa visa prabhava* (Effects of snake poison)[8]:**

- *Darvikara* snakes cause aggravation of *vata dosha*, *mandali* snakes cause aggravation of *pitta dosha*, *rajimanta* snakes cause aggravation of *kapha dosha* and *vaikaranja* or hybrid snakes cause aggravation of two *doshas*.

***Sarpa sancharana* (Time of movement of snakes)[9]:**

- *Rajimanta* snakes move during the last *yama* means last three hours of the night, *mandali* snakes move during the rest hours of the night and *darvikara* snakes move during the day time.

***Visha svabhava* (Nature of poison)[10]:**

- Poison of *darvikara* snakes is more powerful in young age, *mandali* snakes in old age and *rajimanta* snakes in the middle age. Instead of these, snakes which are frightened by the mungoose, which are young, which are exhausted by water, which are slimy, which are old, which have shed their skin are known to be less poisonous.

Acharya sushurta told five types of snakes while *Acharya charak* and *vagbhat* has mentioned only three type of snakes i.e. *darvikara*, *mandali* and *rajimanta*. All description are same as *Acharya sushruta* but *Acharya charak* describe some new things like *rasa* (taste) of the *visa* (poison).

- Poison of the *darvikara* snake *rukhsh* (dry) and *katu* (pungent), *amla* (sour) and *ushna* (hot) of *mandali* snake, *madhura* (sweet) and *sheetal* (cold) of *rajimanta* snakes. They are vitiated *vata*, *pitta* and *kapha dosa* respectively.

Modern classification of snakes:

There are near about 3500 species of snakes but only 250 species are poisonous. 216 species are found in India and only 52 are venomous. For the medicolegal aspects, snakes can be classified into two categories- poisonous and non- poisonous. But it is not necessary that all non- poisonous snakes are not dangerous, they can also kill small animals.

Nomenclature[11]:

Phylum- Chordata
Class- Reptilia
Order- Squamota
Suborder- Serpentesnaske

Feature of snakes in general[12]:

- Snake bite is more prone in rural than the urban areas.
- Many bites by the poisonous snake are dry bites implying that the snakes fail to inject the venom. About 70 % of bites are by non- poisonous snakes, 15% are dry bites and rests of 15 % bites are due to poisonous snakes[13].
- About 80% of poisonous snake bite in India is by saw-scaled viper and dry bite is mostly by cobra.
- Elongated body and covered by horny epidermal scales, which are generally moulted off several times in a year.
- With the help of the tips of their ribs, they can move one place to another place.
- Having fused eyelids.
- Absence of external ears, but there is a big controversy about the snake ears.
- Skull bones are movably articulated.
- A forked like tongue and plays a role as a sense organ.
- Snakes have also Jacobson`s organ which is a smell organ[14].
- They have a paired copulatory organ.
- Plate like scales on head called shields, on the back these are small arranged called vertebral, on the sides of the trunk are called castals.

Classification[15]:

1. Non – poisonous snakes: Rat snake, vine snake, sand boa and mud snakes are the examples of non-poisonous snakes.

2. Poisonous snakes: They can be classified into five families. These are[16]:

1. Viperidae
2. Elapidae
3. Hydrophidae
4. Colubridae
5. Atractaspididae

- Viperidae: Vipers are included in this family like russell`s viper, saw scaled viper, gaboon viper, pit viper and bushmaster. They are mainly found in Asia and Americas. They all have well developed longer fangs on hinged maxillae and can rotate during biting. Unlike the other families, they have typically venom glands. They have heat sensing pit-organs at the front of the head giving some degree of infrared or heat sensitive "vision".

Elapidae: Cobra, king cobra, krait etc. are the snakes which are related to this family common in Asia and Africa. They have small to moderate sized fangs at the front of the mouth and these are may be true fangs. Cobra venoms are quite toxic and they are mostly responsible for human morbidity and mortality by poison. Some popular snake species in the Elapidae family are:

Black Mamba, Indian Cobra, King Cobra, Cape Cobra, Green Mamba, Egyptian Cobra etc[17].

The Cobra: Cobra is a shortened form of "Cobra de capello". It is a portuguese term for "snakes with hood"[18]. It has many names like nag, naja tripudians, naja naja and kala samp etc. These are hooded snakes and on dorsal side bear a double or single spectacle mark. Head scales are large, the third labial touches to eye and nasal shields. Hood is only seen in live snakes not in dead because all joints and neck becomes stiff. There are two black spots and three bands are found on the underside of hood. It is found throughout the India. A third variety, the central Asian or black cobra is found in the J&K, Punjab, Rajasthan and Madhya Pradesh.

King cobra: It is also known as rajnag, nagraj, naja bungarus and humadryad. It has also a hood but without any marks. Three to four meters in length and proximal ends of the tail scales are present and divided in the distal ends. Cross bands are found on the body which are different in colors like white, black or yellowish.

Common krait: Karayat, bungarus caerulus, manyar, kalotaro and kawriya are the synonyms of common krait. Snakes have shinny body. They are mainly steel blue or bluish gray color with whitish cross bands. They take up residence inside house.

- Hydrophidae: About 20 species of sea snakes are found in India. They are usually bluish, grayish or greenish in color. These are also known as sea snakes and mostly features are related to the cobra like fang structure. But they lives in aquatic, usually marine environment. They are a significant cause of poisoning amongst fisherman in the Indian and Pacific Ocean. Example: Stroke`s sea snake
- Colubridae: It is the largest family of snakes. These are also known as harmless snakes. There are only few snakes of this family cause's injury to humans. Some species have modified salivary glands which producing toxins, but without true fangs. A few of these may cause poisonous effect in humans, though are not expected to be lethal.
- Atractaspididae: These are viper like snakes find in Africa and Middle east and having side fangs. They have unusual fang structure and venoms, which contain endothelin like compounds called sarafotoxins, causing smooth muscle contraction[19].

Snakes and their venom effect[20]:

• **Family**	• **Venom effect**
• Viperidae	• Haemotoxic
• Elapidae	• Neurotoxic
• Hydrophidae	• Neurotoxic + Myotoxic
• Atractaspididae	• Myotoxic

Venom composition[21]:

Snake venom is the toxic the toxic saliva secreted by modified parotid salivary gland. It is clear, amber colored when fresh. Toxins have low molecular weight, polypeptides and proteins, glycoproteins. Having enzymes like proteinase, hyaluronidase, Cholinesterase, ATPase, ribonuclease etc. It may be neurotoxic, hemotoxic and myotoxic. The snake poisoning is known as ophitoxaemia[22].

Features of poisonous and non-poisonous snakes[23]:

S.no.	Features	Poisonous snakes	Non-poisonous snakes
1.	Head scales	Small and large scales are seen with: • Heat sensing pit antero- inferior to the eye (pit viper). • 3rd labial touches eye and nasal shields (cobra). • Central row of scales on back enlarged; under surface of mouth has only four infralabials, 4th being largest (kraits).	Large with some exceptions.
2.	Belly scales	Large and cover the entire breadth of belly	Small, like those on back and do not cover the entire breadth
3.	Fangs	Long and canalized, like hypodermic needle	Short and solid
4.	Scales distal to anal plate	Single row	Double row
5.	Tail	Compressed	Not markedly compressed
6.	Habits	Nocturnal	Not so
7.	Bite marks	Two fang marks, with or without small marks of other teeth	Number of small teeth marks in a row

Medico-legal importance of snake poisoning:

- ✓ Snake bite is generally accidental, rarely homicidal and still rarely suicidal[24].
- ✓ Occasionally, a murder is committed by throwing a poisonous snake on the bed of sleeping person.
- ✓ Queen Cleopatra is said to have committed suicide after her forces were defeated in battle. She chose to submit to the bite of an **asp** - an exotic variety of viper, rather than humiliation by her enemies[25].
- ✓ Cattle are sometimes poisoned by charmers.
- ✓ Detection of thromboplastin activity- viperine snake bite.
- ✓ Sui poisoning of cattle resembles viperine snake bite.
- ✓ According to Burton, cobra venom is a potential source of medicines also, including anticancer drugs and painkillers[26].

CONCLUSION

Snake is a dangerous reptile due to their poison but mostly it attacks only for saving its own life. As per ancient literature available the snakes hold whole earth so they should be worshipped. Total eighty snakes are told by *Acharya sushruta in kalpa sthana* by different ways like no., gender and cast etc. In modern science, it is classified into two categories like poisonous and non- poisonous. Snake also play an important role to maintain the ecosystem. So we should save it as well as aware the society about snake bite and their general treatments. The more you learn about snakes the more you learn that they are incredible creatures worthy of our respect and protection and the animals that we can learn to live with them.

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